

## WHAT MAKES AN EXPERT?

When Jeff Hawkins was growing up on the north shore of Long Island, years before he designed a small computing device that changed the world, he and his two brothers and his father invented stuff, mostly wild-looking contraptions that floated. "My house was a little like the old movie *You Can't Take It with You*," he later reported. At dinnertime, the boys and their father wolfed down their meals and went immediately to the gigantic garage that seemed larger than all the rest of the house put together. In that magic space, they tinkered with plastics, metals, and woods, fashioning a crazy boat that looked more like an alien hovercraft than like any of the usual sailing vessels that plied the waters of Long Island Sound on a Sunday afternoon.

When he wasn't building stuff, he would ride his bike to the library to look up information on history, society, or science. He became fascinated with books on mathematical games, and in high school he joined the math team. Jeff also became intrigued with magic, not just to perform some mystifying trick to baffle his friends, but to understand how people could be fooled by something that so obviously contradicted everything he understood about the universe. He built models in his mind of how the world worked, and if anything challenged those models, he wanted to know why. This future giant in the computer industry became in-

## WHAT MAKES AN EXPERT?

terested in music for much the same reason—not so much to perform but to find out why various sounds would appeal to different people. Why would certain music move you? Why would someone listen to certain patterns of sound and not others?

By the time Jeff entered Cornell as an eighteen-year-old freshman, he had made a list of four great questions he wanted to pursue. First, why does anything exist? "Nothing seems more probable than something," he explained long after he had fathered the first successful mobile computing device and helped build Palm and Handspring into billion-dollar corporations. Second, given that a universe does exist, why do we have the particular laws of physics that we do? Why is it that we have an electromagnetic field, or that  $E = mc^2$ ? he mused. Third, why do we have life, and what is its nature? Finally, given that life exists, what's the nature of intelligence? "In my lifetime, I expected at least to answer the last one," he explained.

Jeff received good grades but never placed at the top of the class. "I did what I had to do in a class," he said, "but I didn't freak out about making the best grades." He usually sat in the front row, paid attention, and did the work, but he focused on what fascinated him. Because simple answers never satisfied, he probed for deeper explanations. "In magic that meant asking not just how the trick was done, but also about how anyone could be fooled by it." In history, it meant hunting for causes and consequences; in engineering, for how and why something worked. Yet he also discovered that for many of the subjects he pursued, there was no place to "look it up," no simple answer.

In college, he didn't have any great teachers or life-changing courses, but he enjoyed his freedom and soon discovered two loves: physics, and the girl he would later marry. "Having someone else in my life made a huge difference," he reported.

He also discovered something else about college. Other people set much of the agenda. "The problem in college," he observed, "is that your interests don't always line up with what you've been assigned to do." So he did what he had to, even if it wasn't his first choice. When that was done, he then went after the questions that fascinated him. "If I had an assignment, I did it, but I pursued thoroughly those things that really intrigued me."

And it was in those pursuits that he took a deep approach to learning, asking in every field why and how, and trying to connect everything together. Most important, he continued to build models of the world in his own mind. "You can build models in math," he noted, "but you could also do it in music, in business, and in engineering." Since childhood, Jeff had been building those patterns, those abstractions that allowed him to understand the world. Now, with the increased knowledge gained in college, he could piece together even more sophisticated ones. He began to theorize from what he learned, to develop concepts, to imagine possibilities and probabilities. Jeff toyed with life, arranging the pieces one way and then another until—from the shadowy world of impressions, confusion, and contradictions—new insights began to emerge.

### Styles of Learning

We live in the midst of some monumental changes in everything we thought we knew about who can do well in school and life. Thirty-five years ago, we thought that people like Jeff Hawkins were an oddity, beyond the reach of mortal students and perhaps a creation of personality, superintelligence, or a mysterious quirk that most of us will never understand. Yet a large and growing body of research suggests that not only can most students achieve Jeff's style of learn-

ing, but if they don't, their college experience can become meaningless. This seismic shift in thinking didn't occur overnight, and it is still not widely recognized. It began with the ideas of Paul Baker and others who grasped the essence of works of the mind, and it continued with important research and theory on expertise, student intentions, university learning, and human motivation. In our investigations of the "best students" we attempt to tie these threads together, offering a powerful tool for success in college and thereafter.

Research on these matters began with a single experiment at a Swedish university more than thirty years ago. In that and subsequent studies, psychologists have discovered that college students will take—usually without even realizing it—one of three basic approaches to their studies that will determine much of what they get out of school. Furthermore—and here's the good news—every student can develop the best of these styles of learning. Yet most people never use the most effective approach because they've been conditioned to do otherwise. Why? More on that later. For now, let's understand those three styles or intentions.

In that original investigation at Göteborg University, psychologists gave a group of students an article and asked them to read it.<sup>1</sup> The collegiate volunteers scurried through the composition, some more quickly than others. Yet the speed with which they devoured the piece mattered far less than did another factor that began to emerge. As the researchers interviewed each of the students, they heard some of them say that they had simply tried to remember as much of the reading as possible. These "surface learners," as the psychologists called them, looked for facts and words they could memorize, attempting to anticipate any questions someone might ask them. In subsequent studies, we have learned that surface learn-

ers usually focus only on passing the exam, not on ever using anything they read.<sup>2</sup>

Meanwhile, other students expressed much different purposes. They wanted to understand the meaning behind the text and to think about its implications and applications, to search for arguments, and to distinguish between supporting evidence and conclusions. These students tried to comprehend what difference an idea, line of reasoning, or fact made, and how it related to something they had already learned. In short, these "deep learners" approached the piece with all of the enthusiasm of a five-year-old on a treasure hunt but with the added skills of analysis, synthesis, evaluation, and theorizing.

In the years following that first study, social scientists have identified a third style of learning that students will take. "Strategic" learners primarily intend simply to make good grades, often for the sake of graduate or professional school. These people will usually shine in the classroom and make their parents proud of their high marks. In many ways, they look like deep learners, but their fundamental concern is different. They focus almost exclusively on how to find out what the professor wants and how to ace the exam. If they learn something along the way that changes the way they think, act, or feel, that's largely an accident. They never set out to do that. They simply want the recognition that comes from graduating with honors.

### The Perils of Surface and Strategic Intentions

Although making the dean's list sounds great, strategic learners seldom become risk-takers because they fear something new or extra might mess up their grade point average. Thus, they rarely go off

on an intellectual journey through those unexplored woods of life, riding their curiosity into a wonderland of intellectual adventure and imagination. They approach college with a checklist rather than with any sense of awe and fascination. As a result, these students often learn procedurally rather than conceptually, following the steps to a calculus problem but understanding little of the ideas behind it because they never intend to do so. To be fair, some of these students are innocently strategic because they've been taught to think of learning in this way. All of them have come to their strategic approach because of conditioning, as we will see shortly. As a result, they can't transfer that problem-solving to a different example involving the same concepts. Strategic learners can plug the right number into the correct formula on a chemistry or physics exam, or put the right words in a properly constructed essay, but it all has little influence on how they think, act, and feel.

Later in life, they may become, at best, what some Japanese theorists called "routine experts," learning all the procedures of their work but seldom becoming inventive.<sup>3</sup> When the problems of life don't follow the norm, routine experts seldom adjust. They have difficulty handling new situations and rarely become pathbreakers, the people who invent new ways of thinking and doing. When confronted with different kinds of problems, they sometimes retreat in frustration. Adaptive experts, in contrast, also know all of those conventional routines, but they have something else we will see in all of our best students and among deep learners in general. They possess the ability and the attitude both to recognize and even to relish the opportunity and the necessity for invention. Such experts love to take on the unknown, to tackle those really difficult problems. They enjoy and know how to improvise, invent, and overcome unexpected obstacles. Our society needs adaptive experts, whether

it is to address the ravages of climate change, fix a sagging economy, or end wars, yet strategic learners seldom provide that imaginative flexibility.

But the problems with strategic and surface learners don't end there. They can become bored with school and suffer from major bouts of anxiety and even depression. They often don't enjoy taking on new problems. Most important, they don't learn much. Remember those physics students from the previous chapter, the ones who received A's but still didn't understand motion? They were strategic learners. They discovered how to plug the right number into the proper formula to get the correct answer on the examination, but they had little notion of what it meant. Their counterparts in English or history classes could write a five-paragraph essay in their sleep, but most of what they wrote had precious little meaning for them. Their education had at best only small influences on the way they would subsequently think, act, or feel. No wonder they approached college like a series of hurdles to jump rather than the exciting ride of a lifetime.

Perhaps I should clarify here. If you try to remember something as you attempt to understand it and relate it to other topics and questions, that is fundamentally different than simply trying to poke it into your brain to pass an examination. To take a deep approach means to take control of your own education, to decide that you want to understand, to create something new, to search for the meaning that lies behind the text, to realize that words on a page are mere symbols, and that behind those symbols lies a meaning that has a connection with a thousand other aspects of life and with your own personal development. Such intentions are intertwined with motivation, growing out of an internal drive but also feeding it with an important fuel and direction. The people we examined

didn't just take control of their own schooling. They created an education for themselves that would make a difference in their own lives and thinking.

I met recently with a college student who had it backward. "You've got a big test coming up," I said. "You seem nervous about it."

"Oh, I am, but I think I'll be OK. All I have to do is memorize about twenty terms. My friend who took the class last year said that's all there is on the test. If I can just get out of that course with a B, I don't think it will hurt my grade point average too much."

Notice the pattern here. When students fear failure, they often can't sleep. They worry, then decide to memorize isolated facts, thinking that will save the day. Maybe they will succeed, pass the test, and survive the course. Maybe not. But it all becomes pretty meaningless. Nothing in this process has any lasting influence. Not surprisingly, surface learners lose their interest. Who could remain fascinated when you are consumed just with survival?

None of this means that surface learners never go deep, that deep learners don't occasionally settle for shallow knowledge, or that strategic learners never understand anything. The research over the last thirty years or so simply indicates that students will develop strong intentions that *usually* guide their study and learning. They develop a style of learning that is predominantly deep, surface, or strategic, and it is this overriding intention that shapes their lives. Many students never learn deeply simply because they never intend anything more than just to survive or shine in the academic world.

### Do Intentions Matter that Much?

Many people apparently still believe that approaches to learning don't matter, and that if you just teach students good methods for

reading and studying, they will use those strategies in their school work. You can see that attitude in hundreds of "how to be a good student" books. Such manuals will show you a multitude of study tricks and other such secrets to academic success without saying a word about intentions or motivation. Of course you must develop good reading, writing, and computational abilities, and learning takes lots of hard work, but if you don't have the intention to learn deeply, all of the skills in the world can leave you short of the mark, as the American psychologist Susan Bobbitt Nolen discovered several years ago.

In a series of studies, Nolen asked students, "What makes you proud?"<sup>4</sup> Some said things like, "I feel most successful when I score higher than other students and I show people I'm smart." She called these people "ego-oriented," and they correspond to our strategic learners. Others responded that they felt most successful when they got a new idea, when something they learned made them want to find out more. She called these people "task-oriented." We've called them "deep learners."

When Nolen looked at students' reading habits, she noticed that the ego-oriented often used surface strategies even if they had been taught to use better ones. They generally tried only to memorize what they read, reading it over and over and trying to remember new words. In contrast, the "task-oriented" students, those people who just loved to learn for its own sake, used much deeper approaches even when no one had prompted them to do so. They looked for basic arguments and decided which information was most important. They thought a great deal about how new information either supported or changed something they already believed, and they asked themselves constantly how well they understood the material. In short, they used strategies that were most

likely to produce understanding, critical thinking, creativity, and adaptive expertise.

Nolen also uncovered another type of student. She called these people "work-avoidance" types. We've seen them before as surface learners. They told her they felt most successful when they could "get out of some work," when all the "work was easy" or when they "didn't have to work too hard." What kind of strategies did these people use? Pretty much the same ones that the ego-oriented students had employed. In short, both the surface or work-avoidance students and the ego-oriented students—our strategic learners—used strategies for reading and learning that would seldom lead to any understanding, or, we suspect, to any innovative work.

### How We Come to Think the Way We Do

If you recognize yourself in any of these descriptions of surface or strategic learners, don't despair. You are not locked in those styles of learning. If you think you are too smart to fall into the weaker intentions, think again. We are all possible victims of surface or strategic approaches, but we can all escape them. Neither intelligence nor personality determine what kind of style students will develop. Researchers around the world have found that some highly capable people can grow surface or strategic tendencies while even average students can muster deep ones. Among our subjects, some people moved from strategic to deep approaches, indicating that the style isn't branded in one's soul. Both the shy and the bold can emerge as any of these three types of students.

A complex set of factors seems to drive many students toward surface or strategic approaches, and if you hope to escape them and find a deep approach, you must understand those forces. Some of

them emerge in school. If you face, for example, a steady diet of multiple-choice examinations that merely ask you to recognize isolated facts, it seems not at all surprising that you will eventually conclude that the goal in life is to memorize isolated facts, rather than search for meaning. Essay exams that expect students merely to spit back what the book or teacher told them encourage shallow, not meaningful, learning. As a former colleague put it, "If an anthropologist from Mars landed on this campus and tried to determine the purpose of a college education, she might rightfully conclude that it is to learn how to take blue book examinations."

An emphasis on coverage rushes students through material, giving them inadequate time to contemplate deeply. Classes that entail large quantities of work can force people to look for superficial shortcuts just to survive the experience. Students often fill their lives with a variety of distractions that also deny them the time to go deep, and with the cost of higher education escalating and the amount of financial aid declining, many must work long hours outside school to pay the bills. The financial pressures to rush through school, get the degree, and get a job are tremendous. Yet schools do not bear all of the responsibility. They are set in a larger society that constantly pushes people toward the superficial and encourages students to value honors and recognition over deep understanding.

### Intrinsic and Extrinsic Motivators

There is, however, something even more fundamental about schooling that tends to foster surface and strategic approaches and that produces the biggest blow to deep learning. Much of that something lies within a thought problem and subsequent experiment

that two young psychologists, Edward Deci and his colleague Richard Ryan, concocted years ago.<sup>5</sup> It goes something like this: Think of something that you love to do—to play baseball, read romantic novels, cook lasagna, do math problems, or study history. Suppose someone pays you to pursue that favorite activity, then later stops giving you that reward. What will happen to the level of your original, internal interest in the face of this external motivator and its subsequent withdrawal? Will it go up because you had that outside incentive, stay the same, or go down? In other words, how do rewards and punishments ultimately influence your desires?

Conventional wisdom and the prevailing social science of the day said that if you want somebody to do something, give them a reward for their work, and they will most likely repeat it in the future. Like rats in a maze, according to this popular doctrine, humans will work hardest and perform best if they have an extrinsic motivator waiting for them. But the two professors had their doubts and turned to their psychology laboratory to find the answer.<sup>6</sup> Over scores of investigations, the Rochester social scientists and others have concluded that external motivators can actually reduce interest, especially if someone feels manipulated by them. In the most dramatic of those experiments, students who had been paid to do a task lost all interest while those who did it voluntarily kept working. These findings have enormous significance because if you don't care about studying, you are unlikely to take a deep approach.

You couldn't think of a better model for Deci's and Ryan's thought problem than most formal education. Even when children enter the experience full of mental excitement, wonder, and fascination, school showers them with extrinsic rewards well designed to kill any internal motivation. At an early age, people learn to work for a gold star or a good grade, and, as one of Deci's colleagues put

it, they feel a "loss of the locus of control." In other words, they feel manipulated. As their sense of being an independent person slips from them, their interests fade beneath an avalanche of "requirements" and "assignments." They are no longer in charge of their own education. Their childhood curiosity often languishes and dies.

Even the structure of a formal education tends to reinforce this process.<sup>7</sup> People are most likely to take a deep approach to learning when they are trying to answer questions or solve problems that they regard as important, intriguing, or just beautiful, and they can do so without feeling like someone else controls their education. In most classes, however, students usually aren't in charge of the questions, leaving an enormous gap between the realities of schooling and the conditions that promote deep approaches. Although we can all make a good case that teachers should control the questions simply because they know more and can imagine inquiries that their students will never otherwise consider, the structure nevertheless fosters strategic and surface thinking.

Consider my niece. When she was five years old, she and I took an automobile trip from Austin to San Antonio, Texas. In the seventy-eight miles we rode down Interstate 35, that little girl asked me about seventy-eight hundred questions, constantly peppering me with one inquiry after another. For the most part, she wanted to know about astronomy. "Where's the sun at night?" she asked. "Where are the stars during the day?" Her appetite for knowledge, like that of so many five-year-olds, knew no bounds.

Fast forward about fifteen years. My niece had just started her junior year in college, and I was anxious to hear about her upcoming semester. "What are you going to take this term?" I inquired when I saw her at a family reunion.

"A bunch of required stuff," she muttered.

"Oh, like what?"

"I've got to take some science courses," she pushed back with a grimace and sigh.

"What did you decide to take?"

"I signed up for an astronomy class."

"Great," I exclaimed. "I know you are very interested in astronomy."

She looked at me like I was completely crazy. "Where did you get such an idea?" she asked incredulously. Something tragic had happened to her since that car ride so many years before. She had gone to school. In the process, she had lost that childhood curiosity that had so animated the five-year-old days of her life. It's an all-too-familiar story.

Yet every member of the group we studied went to school, and each eventually emerged as a highly inquisitive and productive person. Indeed, their ability to remain or become curious despite formal education became a key ingredient in their flourishing as critically thinking, creative, and adaptive experts. How did they do it? Across the conversations I had with extraordinarily accomplished individuals, it became clear that they had managed to ignore extrinsic motivators like high marks and to find intrinsic reasons for their studies. Many told me they didn't care about grades, except for what those marks said about their thinking. "I'm moved," Neil deGrasse Tyson confessed, "by curiosity, interest, and fascination, not by making the highest scores on a test." Many of the men and women we interviewed had achieved considerable fame and fortune, yet neither of those gods seemed to drive their work either.

Let me clarify. Strategic and surface learners display little interest in understanding anything. They just want to survive or shine, and for them, grades represent nothing more than a passport to some-

thing else, a ticket to survival, or to fame and glory. Grade point averages are like points in a card game that can get you somewhere else. You play the game of school to win against your competition, not to learn. Not surprisingly, grades often feel manipulative to these students. They feel little sense of control over their own education. In contrast, deep learners in general might have some interest in grades, but only to the degree that they convey useful assessments of their work and abilities that they could use to improve. With a teacher whom they respect highly, they might anxiously await the grade because of what it represents, but they are most interested in the substantive feedback to their thinking and work. They aren't interested in the grade per se but in what it says about how well they are thinking and acting. "Keeping up their grades" means maintaining high intellectual or artistic standards. Grades offer a simple shorthand for something more substantial, and deep learners focus on that higher-order meaning rather than the symbols themselves or their "point value" in a competitive game. Motivation remains intrinsic.

Even when someone in our study of deep learners paid attention to her grade point average, as Debra Goldson, a physician in New Jersey, confessed doing, she still didn't lose sight of her primary learning objective. Grades never became her motivation. For Debra, her focus remained on understanding what would help her become an excellent physician, and that is what pushed her through school.

How did these people dodge the scourge of extrinsic rewards or escape from it after first surrendering to it? Part of their secret, no doubt, came from examining their lives and coming to appreciate the qualities and perspectives that only they could muster. Self-examination led students to understand those passions that would excite their soul and even to realize the harm that extrinsic motiva-

tors could inflict if they remained unaware of their power. They could unleash a fountain of insights into what they could accomplish, the exceptional nature of their life stories, and the potential of their special contributions. They possessed an empowering and motivating perspective on the educational process.

What did they discover about themselves? While each of our best students found his or her own combination of motives, three key factors appeared in the lives of nearly all of them.

Most basic, they rediscovered the curiosity of childhood. They puzzled over the unknown and stood in awe of the world in which they lived. They appreciated the uniqueness of their individual insights. They found the joy of standing before a body of material or an experience and wondering what it means, how it's connected with other matters, what it implies, or how they might apply it to some question or problem. As they discovered their personal passions, our subjects found ways to build on those initial interests, constantly integrating new subjects with old ones and expanding their relevant world. These best students discovered how to explore human society, the arts, and nature, and how to find links among their interests. They tinkered with the unknown, toyed with life, and found great joy in both the work and the fruits of their labors. More of life became interesting and relevant.

Second, they found great pleasure in learning how to be creative, discovering what Paul Baker had called the dynamic power of their minds. "I studied in major part," one person said, "because everything I learned, all the ideas and insights, helped spark imagination and made me more productive." They found considerable motivation in just learning about themselves and how they could grow. Many of our students even became intrigued with the process of discovery and investigated how their own minds functioned and



how they could learn to improve their thinking. Each step in that growth—success or failure—gave them marvelous new ideas about how they could become more productive and creative. They did not, however, just set out to become creative for its own sake. That productive life had a purpose that drove their endeavors. They sought to grow and use their creativity in order to address some issue or achieve some goal that had become important to them.

Because they understood the principle that all of us are unique, they also grasped that each of us can benefit from the special contributions of other people. We can learn to integrate the insights, perspectives, and wonderful works of the mind that others have fashioned out of their peculiar histories. “Part of the creative process,” Paul Baker had insisted, “is the ability to recognize good ideas when you encounter them.” In essence, then, motivation came in part from simply marveling at even the small accomplishments of others, letting each triumph challenge and inspire. “I came to appreciate works of art,” Ernest Butler reported, “that questioned and invigorated the way I was thinking.”

### Finding a Purpose for Education

As these best students sought to develop the power of their own minds and to let curiosity drive their lives, those quests became potent parts of their motivation in school, transcending grades and honors. But that alone could not sum up what drove many of our subjects. Most of the people I interviewed had clearly thought deeply about the most profound questions of life. They sought a meaning and purpose for their existence. Who am I? Why am I here? What is my role? Out of that quest they had thought about what they valued, the kind of person each of them wanted to be, and the

type of world they hoped to help create. We heard stories from people who had fashioned a keen sense of justice and compassion, and had developed the capacity for empathy. Their deeply felt values defined their sense of responsibility to a larger community and helped drive their work. For some, such thoughts rested in religious convictions; for others, they sprang from strictly personal and family values.

Recent research suggests that most students enter college with similar concerns about values. A seven-year study in the United States discovered that eighty percent of entering college students expect their collegiate experience to help them address spiritual questions about their purpose in life, and two-thirds “say that it is either ‘very important’ or ‘essential’ that college ‘helps you develop your personal values’ and ‘enhances your self-understanding.’”<sup>8</sup> Much the same pattern prevailed among the highly creative people we studied. Their lives brimmed with concerns for reason and purpose, and, as we shall see repeatedly, they often found their greatest satisfaction in struggles for social justice. They distinguished themselves because they never lost those values, and they let them drive their academic and personal successes.

“I grew up in a family that stressed giving back,” Joel Feinman, a public defender from Arizona, reported. “We were quite fortunate and had accumulated considerable wealth, and my parents and grandparents always stressed the responsibility that we had to others. That’s what drove me in college and law school.”

As he and his brother grew up in Tucson, he heard that message constantly, both in what his parents told him and in what they did. They encouraged him to read but to avoid television, and stressed the value of a good education for better understanding the world and contributing to it. By the time he reached high school, he had

become increasingly concerned with political and social issues related to the city's history.<sup>9</sup>

"My father," Joel remembered, "came from a rich New York family, but he taught us to understand the injustices that many Hispanics often face, and to do something about them. We were immigrants from the Hudson Valley, but we had wealth and didn't cross an international border to get here." The disparities he saw between rich and poor seemed unfair and even cruel, and that feeling helped foster a growing concern for social justice that increasingly drove what he learned.

Not every member of our study became as involved in politics as Joel eventually did, but many of them found similar motivations. They developed a keen concern for issues of justice, the kind of world they wanted to create, and the person they wanted to become. They became curious about the world, and those matters helped drive their studies no matter what field they explored. They didn't always win their battles against the extrinsic forces in their lives, but as we shall see repeatedly, they triumphed only when they let go of all the rewards of academic honors and other external payoffs, and let the sheer joy of learning, an interest in personal development as a creative person, and their concern for the broader society drive their performance. We'll see Joel again in Chapter 8 because of the incredible story his passion for justice began to dictate.

### Taking Control of Your Education

In part, success thus comes simply from taking control over your own education, from realizing that you are in charge. Opportunities to learn matter, and without them, no one can succeed, but given the chance, our subjects had to find their motivation for working.

Stephen Colbert told me he took control of his education and began to decide what areas he would explore when he was ten years old, long before he changed the face of comedy with his late-night television show. He had grown up in a large and happy family on James Island, outside Charleston, South Carolina. In his household, learning and curiosity had value. His parents, both devout Catholics, taught their children to ask questions. His father was the first vice president for Academic Affairs at the Medical University of South Carolina.

Because Stephen came last in a family of eleven children, he received the constant attention and admiration of his older brothers and sisters. "They used the term 'adorable' so often that it almost became pejorative," he mused years later. "They were always picking me up, and carrying me around. I felt valued."

On a hot, steamy summer day, he and his father would sometimes go down to Folly Beach Pier, sit on the dock, and fish the waters after asking the locals where best to drop their line. When he was ten, however, those pleasures ended forever. His father and two brothers died in a fiery plane crash outside Charlotte, North Carolina. "After that," he once said, "I saw my job as making my mother laugh." A house once filled with a baker's dozen of voices grew still, except for the joking antics of a little boy bent on comforting his one remaining parent.

Stephen grew up in an American South that often suffered the barbs of national ridicule. On television and in films, a "southern" accent became synonymous with buffoonery and ignorance. In the popular mindset, if you spoke with a South Carolinian drawl, you obviously played with a crippled mind. To compensate, he sought refuge from this mocking and sometimes mean-spirited stereotype and deliberately set out to make himself over, purposefully and care-

fully copying the rhythms and tones he heard from the respected mouths of national newscasters. It was one of his first ventures into creating the roles that would help define his place in American comedy and political satire.

Stephen always read a lot—not for school, but for what he found fascinating. “I only did what interested me,” he remembered. “I just read so much that I would learn incidentally what I needed to pass my courses.” He read ancient and medieval history, in which he could focus on the broad sweep of events and think about causes and consequences. He pored over science fiction, played tabletop roleplaying games, and flirted briefly with becoming a marine biologist. That dream died on the operating table. Surgery intended to repair a perforated eardrum left him deaf on the right side, with no hope of a career that would include scuba diving.

When he went off to college he chose a place where he thought he could study philosophy, but his interest in the theater continued to grow, and after two years at Hampden-Sydney College, he transferred to Northwestern University, where he entered their world-renowned theater program. Within a broad liberal arts base, the school offered a three-year course of study in acting that began in the sophomore year. It included work in all the classics from Shakespeare to Shaw, and offered long hours “working on stage crews” to provide hands-on experience. Stephen was determined to finish the program in two years. That meant, as he explained later, that he worked nearly every waking moment and had little time for socializing, but it also meant that he immersed himself in one of the most enjoyable periods of his life. “I have fond memories of Northwestern,” he said, “but I made few lasting friends other than my teacher.”

At Northwestern, which is located on a sprawling campus hug-

ging the shore of Lake Michigan just north of Chicago, he met and studied with Ann Woodworth, a wonderful teacher whom I wrote about in my book *What the Best College Teachers Do*. “Ann became a friend and valued mentor,” he remembered. “She was very supportive of me; she believed in my ability.” More important, he said, “she encouraged me to be honest with myself about my emotions and that was a difficult thing for me to do, for anybody to do. But she was pretty relentless about it, and for that I’m grateful.”

When still an undergraduate at Northwestern, he began working with an improvisational theater in Chicago. “That really opened me up in ways I hadn’t expected.” In that theater, he learned to accept—even love and embrace—failure. Every person we studied had a similar message. “You must be OK with bombing. You have to love it. That’s a great freeing experience,” Stephen concluded.

For Colbert, the liberating nature of failure crystallized in the theater. “Improvisation is a great educator when it comes to failing,” he noted. “There’s no way you are going to get it right every time.” But that ability to find comfort in bombing had its roots in what his mother had told him repeatedly, perhaps beginning on that tragic day when he was ten years old. “‘Momentary disappointments can be seen,’ as my mother used to say when we had a heart-breaker, ‘in the light of eternity. This moment is nothing in the light of eternity,’ and that opens you up to the next moment if you don’t put too much weight on the moment where you are failing right now.”

“If you don’t conceive of things that way,” he observed while sitting in his office in midtown Manhattan preparing for his nightly television show, “you are stuck only in this moment, and a failure just extends for as long as you conceive of it as important.” That doesn’t mean, he quickly added, “that you shouldn’t learn from it,

but the main thing you should learn is don't worry too much." As for life, "You haven't done it before; how could you possibly get it perfectly right?" Perhaps that attitude helped him see grades not as something that controlled him, but as feedback that he could use.

Stephen had fashioned a philosophy that flowed from his education within the theater, the advice his mother had given him, and the literature he encountered, including the Gospels, and it was that philosophy that freed him to take risks, to explore, to probe deeply, to find self-motivation in what he liked to do, and out of all of that to find an outlet for his creative energies. We found the same general approaches in engineers and journalists, physicians and economists, and a variety of people who learned deeply and worked creatively, who found comfort in the great works of the mind that they produced. Yet for the people we interviewed, the particular ingredients of their worldviews varied, as did the wellspring that gave it life, in each case rooted in individual circumstances.

For Stephen, "don't worry" became a kind of mantra. "Jesus said, 'Therefore I tell you, do not worry,'" he quoted. "Who among you by worrying can add a single hour to his life . . . Or a single cubit to his height." Yet his take on that passage from Matthew had filtered through a life filled with learning, with hard work in the theater and the classroom, through his experience and his conviction that he could learn from each episode, each mistake, and each tragedy, even if it meant simply learning to laugh to keep from crying.

In his senior year at Northwestern, he took a course from Lee Roloff, a Jungian psychologist who helped Stephen explore literature from a psychological perspective. "It was a fantastic class, and one that had a deep influence on me," he remembered. Somewhere along the way, he read Robert Bolt's play *A Man for All Seasons*, and the essay that the award-winning dramatist had written for the published version of the work. "I must have read that essay a hundred

times," the late-night television star confessed, "and it influenced me profoundly." Through that essay, he explored what it meant to have some central values that defined you as a person, and the ways in which modern society had stripped many humans of any core essence, turning them into nothing more than consumers of material goods. That quest for values drove much of Colbert's deep educational intentions, shaping the person he became and the comedy he developed.

You can see such influence in a hundred satirical skits, in his appearance before a congressional committee on behalf of migrant farm workers, and even in the guests he chooses for his late-night television show. When he sat down one evening with Sean Kelly, a Harvard philosophy professor, to discuss the Ivy League scholar's work on the western classics and the search for meaning in our secular age, the ghosts of that collegiate reading experience reverberated through that conversation.

I heard stories similar to that of Stephen Colbert in interviews with all of the creative people in our study. They sought not just material advancement or fame, but an inner growth, a curiosity about the world that led them to explore the humanities, the arts, and the world of ideas. Frequently this meant they were as much concerned with their own personal development as human beings and the values they held as they were with obtaining knowledge or wealth. All of that became part of their deep approach to learning.

### Avoiding the Devil

Think for a moment about some other possible outcomes to self-reflection. For some, such a focus on the self might lead to an arrogance that produces little and becomes destructively insensitive. It

can also foster a kind of self-delusion. Many students who win their way into highly prestigious institutions, for example, often think that they are solely responsible for their academic success, an idea that highly influences their sense of justice. They come to believe that they deserve their good fortune and other people don't. With such haughtiness, they often can't seem to understand the complex forces that shaped their own lives and those of everyone around them. Sometimes that self-importance can backfire if they ever fall short of their expectations of themselves. They may become depressed, overly anxious, or even suicidal; or they may abuse alcohol, drugs, and other people. Confidence can turn into self-doubt, pity, or a selfishness more reminiscent of a two-year-old. Even if life never turns sour, such people can still lack empathy, compassion, and any sense of justice. People who overcome extreme difficulties like poverty and racial discrimination and rise to great heights of wealth and fame sometimes have the most trouble developing any understanding of other people and the difficulties they face.

Yet those who dwell on the difficulties and disadvantages they face in life can become locked in a life of self-pity and failure, constantly blaming any shortcomings on something else and never taking responsibility for their own education. They can develop a condition that the psychologist Martin Seligman first called "learned helplessness," in which people who have faced repeated obstacles that prevent them from succeeding still act as if they can't help themselves even when those obstacles disappear.<sup>10</sup> They might even blame their shortcomings on themselves and sink into a destructive complacency about their alleged inabilities.

As they discovered the power of intrinsic motivation and took control of their own interests, how did the people we interviewed manage to avoid both blind arrogance and a sense of helplessness? The answer to this question is extraordinarily important in un-

derstanding their development as creative people. Primarily, they learned to use their past rather than lionize or reject it. Indeed, an important part of that self-examination became a way to recognize how external forces could influence their lives, and then to find ways to turn those factors into something constructive. As a result, they lived in awe of the enormous complexity of life and how all the intricate twists and turns, the social and historical currents, could shape its contours. They acknowledged the need for growth in themselves while appreciating the work of others. That combination fostered a blend of humility and confidence that characterized their accomplishments as creative people.

Dudley Herschbach, the Stanford football player who later won a Nobel Prize in chemistry, perfectly expressed this quiet confidence and humility. "Real science," he once said, "recognizes that you have an advantage over practically any other human enterprise because what you are after—call it truth or whatever—waits patiently for you while you screw up." He spoke about the humbling experience of standing before nature and trying again and again to figure it out. "Nature," he said, "speaks in many tongues and they are all alien. What science is trying to do is decipher one of those dialects." If scientists make any progress, he concluded, they do so "because nature doesn't change and we just keep trying. It's not because we are particularly smart but because we are stubborn." We saw that same kind of humility and determination repeatedly in the lives of our best students.

### A Musical Journey

When she arrived at the Sony Recording Studios on a warm June evening, Tia Fuller found nearly seven hundred people lined up along the street leading into the building. The young saxophonist

from Colorado had already spent nearly eight hours that day rehearsing for her first jazz album, *Healing Space*, but she came to this place like everyone else gathered on those streets in Manhattan to audition for a spot in Beyoncé's touring band. If she could win a place in the ensemble with the internationally renowned rhythm and blues singer, she would join a whirlwind life of playing before twenty thousand people, night after night. Her own fledgling career in jazz would undoubtedly benefit from that experience. She could learn. As the weather grew increasingly hotter in the days to follow, she would return three times to play for the famous diva and her party, constantly ducking in and out of rooms filled with other women seeking a place in the all-female band.

Tia began her journey to this place and time in a musical family in Aurora, Colorado. Her parents, both educators and musicians, filled their house and yard with the sounds of John Coltrane, Cannonball Adderley, and Charlie Parker. Both her mom and dad sang and played music. "If we were cleaning the house or having a barbeque," she once recalled, "music was constantly playing." When she turned three, she started piano lessons, but one day when she was thirteen, sitting in one of the swivel chairs in her childhood kitchen, she announced, "I'm going to play the saxophone."

Years later, when she saw a videotape of that childhood declaration, it helped mark the beginning of a journey she had not yet consciously joined. In high school, she did play the saxophone, but her life became a scramble of pom-pom squads, marching bands, social whirls, and, oh yes, her classwork. She did well in school, but had no particular passion beyond making good grades. She lacked what she would later call a "crystallized vision" of what she wanted to do and be.

In her senior year, Tia won admission to Spelman College in At-

lanta. She chose the liberal arts school rather than a conservatory because she wanted a broad education, yet her initial focus fell on "doing well in school," with no particular goal or interest. "In my freshman year," she admitted years later, "I studied primarily for the grades I could get. Nothing more; nothing less."

Every freshman student at Spelman takes a yearlong course on the African diaspora, the history of African people as they spread around the world, often forced into migration as captured slaves. The course introduces students to historical study, fosters a deeper self-awareness, and helps them work on their writing as they compose more than one small paper each week and receive extensive feedback on their efforts. Tia became increasingly fascinated with this history, but she struggled with her writing. In the end, she received a D in the course.

She felt devastated and defeated, but that experience became an important turning point in her education. Because the course lasted a full year, she still had another semester to go, and the prospect of more bad grades. When she returned to campus for the spring, she went to see the professor and simply asked for help. "She told me I had no organization in my writing and didn't support my ideas," she recalled.

At that point, something extraordinary began to happen. Tia seized control of her own education, taking responsibility for her writing and her learning. With the help of friends, she worked diligently, constructing arguments, toying with sentences, twisting them one way and then another. She explored her own thinking, constantly asking herself what she was trying to say, and questioning the reasons behind a particular line of thinking. What am I assuming here? What concepts am I using? What if I move this section here? With each trial, she sought feedback from others in her

dorm. "I was fortunate," she noted one day while sipping a cup of tea. "I had plenty of friends who cared deeply about their own work, and who were willing to help me."

In the months and years to come, Tia grew increasingly fascinated with the wide variety of courses she took in science, math, social science, humanities, language, and the arts. In a psychology class, she became intrigued with studies of sleep and the subconscious. In a course on western music, she learned how to integrate that study with her love of jazz, and how the exploration of any music enhanced her understanding of all of it. She became enthralled with big questions, important concepts, and the connections she could draw. Her dorm room evolved into a kind of constant seminar, with vigorous and lively discussions of a wide range of topics. Tia's passion and fascination for her courses grew, and when she studied, she brought that enchantment with her. She carried a dictionary, a notebook, and a highlighter everywhere. "When I read," she remembered one day in West Orange, New Jersey, not far from where Thomas Edison had built his laboratory of innovation a century earlier, "I always took notes and thought about how things connect."

Rather than cramming, she studied over a long period, giving herself time to think about the topic and ask questions, to associate as widely as possible. "Often I made flashcards of key words and vocabulary," she reported, "and I would review those items repeatedly," mulling over each word's implications and applications. "I would review something over an extended period until it became a part of me." She compared and contrasted, and consciously thought about how something new might challenge some older idea or understanding. She usually studied with friends, and they would dis-

cuss ideas over and over, often stopping to quiz each other and bounce ideas back and forth until they were at ease with the vocabulary of a new area. She and her friends wrote outlines of possible essay questions even when they expected a multiple-choice test. For Tia, she wasn't just preparing for an examination, she was exploring ideas and information. She often studied in different locations. "I could often recall something," she observed, "because I could remember that I had reviewed it in a certain place."

Her greatest passion developed around her music, as that childhood ambition about playing the saxophone continued to mature. Before her freshman year started, she visited the campus at Spelman and met Joe Jennings, a jazz musician and educator who became her mentor and "second father." Under his careful guidance—he offered "lots of nonjudgmental feedback"—Tia began to flower as a musician, becoming consumed with her desire to play well.

In jazz, the music becomes more powerful when it begins to "seep into your subconscious," she observed, and you build structures that become a permanent part of your reflexes. Tia began to practice six and seven hours a day, and she began to plan. "I set goals for myself, ten years, five years, one year, six months, one month, two weeks, one week, and the next day." Every night before she went to sleep, she would write in her journal for ten minutes about the plans she had made, mapping the next day with precision. "I usually got up at 7 am and went to the Shoot and Run to work out. Then shower, get dressed, and off to class." Between classes she would practice and study. "I tried to live a balanced life," she noted some years later. "I had time to practice, go to class, to the library, and relax with friends, but I planned that out each night before I went to bed." She also planned time for meals, usually ate three times a day,

avoided red meat, and always included something green. "Exercise, practicing, studying, meeting with friends, all became a way of life for me."

If she had a large project, she would first "envision herself" finishing it. "I would keep focused on the light at the end of the tunnel," she explained, "and what that accomplishment would mean. That would help me develop a crystallized vision." Once she had developed that vision, she would use all the resources at her disposal to achieve it. In college, she began networking, making connections that would help her learn and grow. She joined professional organizations like the International Association of Jazz Educators and collected business cards. On Friday nights after six, she went out to the local jazz clubs, always taking her horn in case of any opportunity to engage in an impromptu session. During the week, late at night, she sometimes slipped away to a jam session somewhere.

In her second year she joined a social organization that emphasized humanity, nurturing, forgiveness, wisdom, and spirituality. "Everyone thought of it as a sorority," she remembered, "but it was really more than that." Anchored in religion, "but not necessarily in Christianity," the group practiced "weekly rituals," including one in which women spoke to no one except to discuss coursework with their professors or another student. Tia found considerable comfort in such practices, and in her own daily reading of biblical scriptures.

Yet her success in college, the deep learning that she achieved, came primarily from her passion, her ability to approach life with curiosity, and her intrinsic motivation. She began with a vision, took control of her own education, found who she wanted to become, and cultivated the habits that would sustain her. "They had to become part of a lifestyle," she concluded.

When she graduated magna cum laude from Spelman College, Tia didn't plan additional schooling, but the University of Colorado gave her a "free ride" to pursue a master's degree in jazz education. After finishing that degree, she moved to New York City.

On the Friday before Father's Day, Tia had been recording her first album all day long when she got a call from Beyoncé's staff, asking her to return for one more audition. On Sunday, she learned she had gotten the job. In the months and years to come, Tia treated the experience of playing with Beyoncé as she did everything else in her life: it simply expanded her education. "I've tried to take that experience" of watching her work, she once told a reporter, and learn "how to function as a bandleader."

Sometimes that curiosity so essential to intrinsic motivation, deep learning, and adaptive expertise appears early in life and never goes away. For others it comes and goes, and sometimes comes again. Can you rekindle it? I saw my niece recently. "What are you doing with yourself?" I asked.

"I teach astronomy," she reported with a smile.